



SEQUENCE LISTING

<110> Hsueh, Aaron J. W.

Hsu, Sheau Yu

Liang, Shan-Guang

Van Der Spek, Petrus Johannes

<120> Novel Mammalian G-Protein Coupled

Receptors Having Extracellular Leucine Rich Repeat Regions

<130> STAN-084

<140> 09/647,067

<141> 2000-09-25

<150> PCT/US99/06573

<151> 1999-03-25

<150> 60/079,501

<151> 1998-03-26

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 Ile Leu Leu Val Leu Met Asn Asn Val Leu Thr Arg Leu Pro Asp Lys
 225 230 235 240
 Pro Leu Cys Gln His Met Pro Arg Leu His Trp Leu Asp Leu Glu Gly
 245 250 255
 Asn His Ile His Asn Leu Arg Asn Leu Thr Phe Ile Ser Cys Ser Asn
 260 265 270
 Leu Thr Val Leu Val Met Arg Lys Asn Lys Ile Asn His Leu Asn Glu
 275 280 285
 Asn Thr Phe Ala Pro Leu Gln Lys Leu Asp Glu Leu Asp Leu Gly Ser
 290 295 300
 Asn Lys Ile Glu Asn Leu Pro Pro Leu Ile Phe Lys Asp Leu Lys Glu
 305 310 315 320
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 340 345 350
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 Leu Ser His Ile Tyr Phe Lys Lys Phe Gln Tyr Cys Gly Tyr Ala Pro
 370 375 380
 His Val Arg Ser Cys Lys Pro Asn Thr Asp Gly Ile Ser Ser Leu Glu
 385 390 395 400
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Ala Val Thr Cys Phe Gly Asn Ile Phe Val Ile Cys Met Arg Pro Tyr
 420 425 430
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 Cys Ala Asp Cys Leu Met Gly Ile Tyr Leu Phe Val Ile Gly Gly Phe
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 Asp Leu Lys Phe Arg Gly Glu Tyr Asn Lys His Ala Gln Leu Trp Met
 465 470 475 480
 Glu Ser Thr His Cys Gln Leu Val Gly Ser Leu Ala Ile Leu Ser Thr
 485 490 495
 Glu Val Ser Val Leu Leu Leu Thr Phe Leu Thr Leu Glu Lys Tyr Ile
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 Ser Ala Ile Thr Ala Thr Glu Ile Arg Asn Gln Val Lys Lys Glu Met
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 Trp Ile Pro Ile Phe Val Val Lys Phe Leu Ser Leu Leu Gln Val Glu
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 Lys Glu Met Ile His Arg Phe Trp Tyr Asn Tyr Arg Gln Arg Lys Ser
 690 695 700
 Met Asp Ser Lys Gly Gln Lys Thr Tyr Ala Pro Ser Phe Ile Trp Val
 705 710 715 720
 Glu Met Trp Pro Leu Gln Glu Met Pro Pro Glu Leu Met Lys Pro Asp
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 <211> 3584
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 <213> homo sapiens

<220>
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 gggggtggac aggatgtcaa gtgctccctt ggctatttcc cctgtgggaa catcaciaaag 240
 tgcttgctc agctcctgca ctgtaacggg gtggacgact gcgggaatca ggccgatgag 300
 gacaactgtg tgggtggttt gtgccagtgc atgtctttgc caggtctgga gcttgactgg 360
 atgaaacat ttacgagtgt tccatcggtt tcttcaaag tgactgcaat gtcacttcag 420
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 gaagatcttc acagactaga atggctgata attgaagata atcacctcag tcaaatctcc 660
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Q8

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ctttacctgt catgtgcatc agcaagaatc ataggcactt ttaaataaag gtttaaagtt 2760
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gtatgagtag ggcagagaag tggatcagaa aaactagaat gaggataaac atttacatta 3060
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tgtacacatt tcactttaag cagaaaatct ttcttcaaga aatgacttta ctttctcttt 3360
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gatagtttca aatacnccaa aaatgtttgc aacacaaaaa tactggaatc naaccataat 3540
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<210> 8

<211> 722

<212> PRT

<213> homo sapiens

<400> 8

Q8

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          20          25          30
Pro Cys Gly Asn Ile Thr Lys Cys Leu Pro Gln Leu Leu His Cys Asn
          35          40          45
Gly Val Asp Asp Cys Gly Asn Gln Ala Asp Glu Asp Asn Cys Val Val
          50          55          60
Val Leu Cys Gln Cys Met Ser Leu Pro Gly Leu Glu Leu Asp Trp Met
65          70          75          80
Lys Pro Phe Thr Ser Val Pro Ser Val Ser Ser Asn Val Thr Ala Met
          85          90          95
Ser Leu Gln Trp Asn Leu Ile Arg Lys Leu Pro Pro Asp Cys Phe Lys
          100          105          110
Asn Tyr His Asp Leu Gln Lys Leu Asp Leu Gln Asn Asn Lys Ile Thr
          115          120          125
Ser Ile Ser Ile Tyr Ala Phe Arg Gly Leu Asn Ser Leu Thr Lys Leu
          130          135          140
Tyr Leu Ser His Asn Arg Ile Thr Phe Leu Lys Pro Gly Val Phe Glu
145          150          155          160
Asp Leu His Arg Leu Glu Trp Leu Ile Ile Glu Asp Asn His Leu Ser
          165          170          175
Arg Ile Ser Pro Pro Thr Phe Tyr Gly Leu Asn Ser Leu Ile Leu Leu
          180          185          190
Val Leu Met Asn Asn Val Leu Thr Arg Leu Pro Asp Lys Pro Leu Cys
          195          200          205
Gln His Met Pro Arg Leu His Trp Leu Asp Leu Glu Gly Asn His Ile
          210          215          220
His Asn Leu Arg Asn Leu Thr Phe Ile Ser Cys Ser Asn Leu Thr Val

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225 230 235 240
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 260 265 270
 Glu Asn Leu Pro Pro Leu Ile Phe Lys Asp Leu Lys Glu Leu Ser Gln
 275 280 285
 Leu Asn Leu Ser Tyr Asn Pro Ile Gln Lys Ile Gln Ala Asn Gln Phe
 290 295 300
 Asp Tyr Leu Val Lys Leu Lys Ser Leu Ser Leu Glu Gly Ile Glu Ile
 305 310 315 320
 Ser Asn Ile Gln Gln Arg Met Phe Arg Pro Leu Met Asn Leu Ser His
 325 330 335
 Ile Tyr Phe Lys Lys Phe Gln Tyr Cys Gly Tyr Ala Pro His Val Arg
 340 345 350
 Ser Cys Lys Pro Asn Thr Asp Gly Ile Ser Ser Leu Glu Asn Leu Leu
 355 360 365
 Ala Ser Ile Ile Gln Arg Val Phe Val Trp Val Val Ser Ala Val Thr
 370 375 380
 Cys Phe Gly Asn Ile Phe Val Ile Cys Met Arg Pro Tyr Ile Arg Ser
 385 390 395 400
 Glu Asn Lys Leu Tyr Ala Met Ser Ile Ile Ser Leu Cys Cys Ala Asp
 405 410 415
 Cys Leu Met Gly Ile Tyr Leu Phe Val Ile Gly Gly Phe Asp Leu Lys
 420 425 430
 Phe Arg Gly Glu Tyr Asn Lys His Ala Gln Leu Trp Met Glu Ser Thr
 435 440 445
 His Cys Gln Leu Val Gly Ser Leu Ala Ile Leu Ser Thr Glu Val Ser
 450 455 460
 Val Leu Leu Leu Thr Phe Leu Thr Leu Glu Lys Tyr Ile Cys Ile Val
 465 470 475 480
 Tyr Pro Phe Arg Cys Val Arg Pro Gly Lys Cys Arg Thr Ile Thr Val
 485 490 495
 Leu Ile Leu Ile Trp Ile Thr Gly Phe Ile Val Ala Phe Ile Pro Leu
 500 505 510
 Ser Asn Lys Glu Phe Phe Lys Asn Tyr Tyr Gly Thr Asn Gly Val Cys
 515 520 525
 Phe Pro Leu His Ser Glu Asp Thr Glu Ser Ile Gly Ala Gln Ile Tyr
 530 535 540
 Ser Val Ala Ile Phe Leu Gly Ile Asn Leu Ala Ala Phe Ile Ile Ile
 545 550 555 560
 Val Phe Ser Tyr Gly Ser Met Phe Tyr Ser Val His Gln Ser Ala Ile
 565 570 575
 Thr Ala Thr Glu Ile Arg Asn Gln Val Lys Lys Glu Met Ile Leu Ala
 580 585 590
 Lys Arg Phe Phe Phe Ile Val Phe Thr Asp Ala Leu Cys Trp Ile Pro
 595 600 605
 Ile Phe Val Val Lys Phe Leu Ser Leu Leu Gln Val Glu Ile Pro Gly
 610 615 620
 Thr Ile Thr Ser Trp Val Val Ile Phe Ile Leu Pro Ile Asn Ser Ala
 625 630 635 640

as

Leu Asn Pro Ile Leu Tyr Thr Leu Thr Thr Arg Pro Phe Lys Glu Met
 645 650 655
 Ile His Arg Phe Trp Tyr Asn Tyr Arg Gln Arg Lys Ser Met Asp Ser
 660 665 670
 Lys Gly Gln Lys Thr Tyr Ala Pro Ser Phe Ile Trp Val Glu Met Trp
 675 680 685
 Pro Leu Gln Glu Met Pro Pro Glu Leu Met Lys Pro Asp Leu Phe Thr
 690 695 700
 Tyr Pro Cys Glu Met Ser Leu Ile Ser Gln Ser Thr Arg Leu Asn Ser
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 Tyr Ser

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 <211> 707
 <212> PRT
 <213> homo sapiens

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 35 40 45
 Gly Val Asp Asp Cys Gly Asn Gln Ala Asp Glu Asp Asn Cys Val Val
 50 55 60
 Cys Cys Gly Leu Glu Leu Asp Val Pro Ser Val Ser Ser Asn Val Thr
 65 70 75 80
 Ala Met Ser Leu Gln Trp Asn Leu Ile Arg Lys Leu Pro Pro Asp Cys
 85 90 95
 Phe Lys Asn Tyr His Asp Leu Gln Lys Leu Leu Gln Asn Asn Lys Ile
 100 105 110
 Thr Ser Ile Ser Ile Tyr Ala Phe Arg Gly Leu Asn Ser Leu Thr Lys
 115 120 125
 Leu Tyr Leu Ser His Asn Arg Ile Thr Phe Leu Lys Pro Gly Val Phe
 130 135 140
 Glu Asp Leu His Arg Leu Glu Trp Leu Ile Ile Glu Asp Asn His Leu
 145 150 155 160
 Ser Arg Ile Ser Pro Pro Thr Phe Tyr Gly Leu Asn Ser Leu Ile Leu
 165 170 175
 Leu Val Leu Met Asn Asn Val Leu Thr Arg Leu Pro Asp Lys Pro Leu
 180 185 190
 Cys Gln His Met Pro Arg Leu His Trp Leu Asp Leu Glu Gly Asn His
 195 200 205
 Ile His Asn Leu Arg Asn Leu Thr Phe Ile Ser Cys Ser Asn Leu Thr
 210 215 220
 Val Leu Val Met Arg Lys Asn Lys Ile Asn His Leu Asn Glu Asn Thr
 225 230 235 240
 Phe Ala Pro Leu Gln Lys Leu Asp Glu Leu Asp Leu Gly Ser Asn Lys

245 250 255
 Ile Glu Asn Leu Pro Pro Leu Ile Phe Lys Asp Leu Lys Glu Leu Ser
 260 265 270
 Gln Leu Asn Leu Ser Tyr Asn Pro Ile Gln Lys Ile Gln Ala Asn Gln
 275 280 285
 Phe Asp Tyr Leu Val Lys Leu Lys Ser Leu Ser Leu Glu Gly Ile Glu
 290 295 300
 Ile Ser Asn Ile Gln Gln Arg Met Phe Arg Pro Leu Met Asn Leu Ser
 305 310 315 320
 His Ile Tyr Phe Lys Lys Phe Gln Tyr Cys Gly Tyr Ala Pro His Val
 325 330 335
 Arg Ser Cys Lys Pro Asn Thr Asp Gly Ile Ser Ser Leu Glu Asn Leu
 340 345 350
 Leu Ala Ser Ile Ile Gln Arg Val Phe Val Trp Val Val Ser Ala Val
 355 360 365
 Thr Cys Phe Gly Asn Ile Phe Val Ile Cys Met Arg Pro Tyr Ile Arg
 370 375 380
 Ser Glu Asn Lys Leu Tyr Ala Met Ser Ile Ile Ser Leu Cys Cys Ala
 385 390 395 400
 Asp Cys Leu Met Gly Ile Tyr Leu Phe Val Ile Gly Gly Phe Asp Leu
 405 410 415
 Lys Phe Arg Gly Glu Tyr Asn Lys His Ala Gln Leu Trp Met Glu Ser
 420 425 430
 Thr His Cys Gln Leu Val Gly Ser Leu Ala Ile Leu Ser Thr Glu Val
 435 440 445
 Ser Val Leu Leu Leu Thr Phe Leu Thr Leu Glu Lys Tyr Ile Cys Ile
 450 455 460
 Val Tyr Pro Phe Arg Cys Val Arg Pro Gly Lys Cys Arg Thr Ile Thr
 465 470 475 480
 Val Leu Ile Leu Ile Trp Ile Thr Gly Phe Ile Val Ala Phe Ile Pro
 485 490 495
 Leu Ser Asn Lys Glu Phe Phe Lys Asn Tyr Tyr Gly Thr Asn Gly Val
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 Cys Phe Pro Leu His Ser Glu Asp Thr Glu Ser Ile Gly Ala Gln Ile
 515 520 525
 Tyr Ser Val Ala Ile Phe Leu Gly Ile Asn Leu Ala Ala Phe Ile Ile
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 Ile Val Phe Ser Tyr Gly Ser Met Phe Tyr Ser Val His Gln Ser Ala
 545 550 555 560
 Ile Thr Ala Thr Glu Ile Arg Asn Gln Val Lys Lys Glu Met Ile Leu
 565 570 575
 Ala Lys Arg Phe Phe Phe Ile Val Phe Thr Asp Ala Leu Cys Trp Ile
 580 585 590
 Pro Ile Phe Val Val Lys Phe Leu Ser Leu Leu Gln Val Glu Ile Pro
 595 600 605
 Gly Thr Ile Thr Ser Trp Val Val Ile Phe Ile Leu Pro Ile Asn Ser
 610 615 620
 Ala Leu Asn Pro Ile Leu Tyr Thr Leu Thr Thr Arg Pro Phe Lys Glu
 625 630 635 640
 Met Ile His Arg Phe Trp Tyr Asn Tyr Arg Gln Arg Lys Ser Met Asp
 645 650 655

Ser Lys Gly Gln Lys Thr Tyr Ala Pro Ser Phe Ile Trp Val Glu Met
660 665 670
Trp Pro Leu Gln Glu Met Pro Pro Glu Leu Met Lys Pro Asp Leu Phe
675 680 685
Thr Tyr Pro Cys Glu Met Ser Leu Ile Ser Gln Ser Thr Arg Leu Asn
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Ser Tyr Ser
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Gly Ser Ala Gly Pro Ser Gly Ala
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<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> signal peptide

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Gln Leu Ala Thr Gly
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<210> 12
<211> 24
<212> PRT
<213> Artificial Sequence

<220>
<223> signal peptide

<400> 12
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Leu Gln Pro Pro Leu Pro Arg Ala
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<210> 13
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> signal peptide

<400> 13
Met Ala Leu Leu Leu Val Ser Leu Leu Ala Phe Leu Ser Leu Gly Ser
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<210> 14
<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> signal peptide

<400> 14
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Arg Asp Leu Gly Gly
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<210> 15
<211> 33
<212> PRT
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<220>
<223> N-flank cysteine-rich sequence

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<210> 16
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<212> PRT
<213> Artificial Sequence

<220>
<223> N-flank cysteine-rich sequence

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 Ser Glu Leu Pro Ser Asn Leu Ser Val Phe Thr Ser Tyr
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 <212> PRT
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<220>
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<400> 17
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 Pro Gly Pro Thr Ala Gly Leu Thr Arg
 20 25

<210> 18
 <211> 29
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> N-flank cysteine-rich sequence

<400> 18
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 Thr Glu Ile Pro Ser Asp Leu Pro Arg Asn Ala Ile Glu
 20 25

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 <211> 31
 <212> PRT
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<220>
 <223> N-flank cysteine-rich sequence

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 Lys Asp Ile Gln Arg Ile Pro Ser Leu Pro Pro Ser Thr Gln Thr
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<210> 20

<211> 332
 <212> PRT
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 <223> Leucine-rich repeats

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 Ala Leu Ser Gly Lys Glu Lys Val Leu Thr Leu Gln Gln Arg Thr Val
 35 40 45
 Ser Glu Ile His Gly Ser Ala Gln Ser Arg Leu Asp Ala His Thr Ser
 50 55 60
 Val Glu Asp Ser Phe Glu Gly Leu Val Gln Leu Arg His Trp Leu Asp
 65 70 75 80
 Ser Leu Glu Val Val Arg Pro Leu Ser Asn Pro Thr Leu Gln Ala Thr
 85 90 95
 Ala Leu Asn Ile Ser Ser Ile Pro Asp Phe Thr Leu Ser Ser Val Val
 100 105 110
 His His Asn Lys Ile Lys Ser Leu Ser Gln His Cys Asp Leu Asp Asn
 115 120 125
 Leu Glu Thr Leu Asn Tyr Asn Tyr Leu Asp Glu Phe Gln Ala Ile Lys
 130 135 140
 Ala Pro Ser Lys Glu Leu Gly Phe His Ser Asn Ser Ile Ser Val Ile
 145 150 155 160
 Asp Gly Ala Gly Gly Asn Pro Leu Arg Thr Ile His Asp Asn Pro Leu
 165 170 175
 Ser Phe Val Gly Asn Ser Ala Phe His Asn Leu Ser Asp Leu His Cys
 180 185 190
 Leu Val Ile Arg Gly Ala Ser Leu Val Gln Trp Phe Pro Asn Leu Thr
 195 200 205
 Gly Thr Val His Leu Glu Ser Leu Thr Leu Thr Gly Thr Lys Ile Ser
 210 215 220
 Ser Ile Pro Asp Asp Leu Cys Gln Asn Gln Lys Met Leu Arg Thr Leu
 225 230 235 240
 Asp Leu Ser Tyr Asn Asn Ile Arg Asp Leu Pro Ser Phe Asn Gly Cys
 245 250 255
 Arg Ala Leu Glu Glu Ile Ser Leu Gln Arg Asn Gln Ile Ser Leu Ile
 260 265 270
 Lys Glu Asn Thr Phe Gln Gly Leu Thr Ser Leu Arg Ile Leu Asp Leu
 275 280 285
 Ser Arg Asn Leu Ile Arg Glu Ile His Ser Gly Ala Phe Ala Lys Leu
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 Gly Thr Ile Thr Asn Leu Asp Val Ser Phe Asn Glu Leu Thr Ser Phe
 305 310 315 320
 Pro Thr Glu Gly Leu Asn Gly Leu Asn Gln Leu Lys
 325 330

as

<210> 21
 <211> 335
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Leucine-rich repeats

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 Pro Lys Gly Ala Thr Gly Tyr Ser Lys Val Leu Met Leu Gln Gln Arg
 35 40 45
 His Val Thr Glu Leu Gln Asn Arg Ser Gln Ser Arg Leu Asp Ala His
 50 55 60
 Ser Tyr Val Pro Ser Cys Phe Ser Gly Leu His Ser Leu Arg His Trp
 65 70 75 80
 Leu Asp Ala Leu Glu Val Gln Ala Arg Ser Ser Ala Leu Gln Ala Met
 85 90 95
 Thr Ala Leu Lys Ile His His Ile Pro Asp Tyr Gly Leu Ser Ser Trp
 100 105 110
 Val Val His His Asn Arg Ile His Ser Leu Gly Lys Lys Cys Asp Leu
 115 120 125
 His Ser Leu Glu Thr Leu Asn Tyr Asn Asn Leu Asp Glu Phe Thr Ala
 130 135 140
 Q8 Ile Arg Thr Ser Asn Lys Glu Leu Gly Phe His Ser Asn Asn Ile Arg
 145 150 155 160
 Ser Ile Glu Lys Ala Val Gly Asn Pro Ser Ile Thr Ile His Phe Asp
 165 170 175
 Asn Pro Ile Gln Phe Val Gly Arg Ser Ala Phe Gln His Leu Pro Glu
 180 185 190
 Leu Arg Thr Leu Thr Leu Asn Gly Ala Ser Gln Ile Thr Glu Phe Pro
 195 200 205
 Asp Leu Thr Gly Thr Ala Asn Leu Glu Ser Leu Thr Leu Thr Gly Ala
 210 215 220
 Gln Ile Ser Ser Leu Pro Gln Thr Val Cys Asn Gln Leu Pro Asn Leu
 225 230 235 240
 Gln Val Leu Asp Leu Ser Tyr Asn Leu Leu Glu Asp Leu Pro Ser Phe
 245 250 255
 Ser Val Cys Gln Lys Leu Gln Lys Ile Asp Leu Arg His Asn Glu Ile
 260 265 270
 Tyr Glu Ile Lys Val Asp Thr Phe Gln Gln Leu Leu Ser Leu Arg Ser
 275 280 285
 Leu Asn Leu Ala Trp Asn Lys Ile Ala Ile Ile His Pro Asn Ala Phe
 290 295 300
 Ser Thr Leu Pro Ser Leu Ile Lys Leu Asp Leu Ser Ser Asn Leu Leu
 305 310 315 320
 Ser Ser Phe Pro Ile Thr Gly Leu His Gly Leu Thr His Leu Lys
 325 330 335

<210> 22
 <211> 174
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Leucine-rich repeats

<400> 22
 Ser Leu Ala Tyr Leu Pro Val Lys Val Ile Pro Ser Gln Arg Gly Leu
 1 5 10 15
 Asn Glu Val Ile Lys Ile Glu Ile Ser Gln Ile Ser Glu Arg Glu Ala
 20 25 30
 Asn Ala Asp Asn Leu Asn Ser Glu Ile Leu Ile Gln Thr Lys Arg Tyr
 35 40 45
 Ile Glu Gly Phe Ile Asn Pro Gly Lys Tyr Ser Ile Cys Thr Gly Arg
 50 55 60
 Lys Phe Asp Val Thr Lys Val Phe Ser Ser Glu Ser Asn Phe Ile Glu
 65 70 75 80
 Ile Cys Leu His Ile Thr Gly Asn Ala Gln Gly Met Asn Asn Glu Ser
 85 90 95
 Val Thr Lys Tyr Gly Gly Phe Glu Glu Val Gln Ser His Gly Thr Thr
 100 105 110
 Thr Ser Glu Lys Glu Val His Leu Glu Lys Met His Asn Gly Ala Arg
 115 120 125
 Ala Thr Gly Pro Lys Thr Ile Ser Ser Thr Lys Leu Gln Ala Leu Ser
 130 135 140
 Tyr Gly Leu Glu Ser Ile Gln Arg Ile Ala Thr Ser Ser Tyr Ser Leu
 145 150 155 160
 Lys Lys Leu Ser Arg Glu Thr Val Asn Leu Glu Ala Thr Thr
 165 170

<210> 23
 <211> 174
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Leucine-rich repeats

<400> 23
 Arg Phe Val Leu Thr Lys Leu Arg Val Ile Gln Lys Gly Ser Gly Phe
 1 5 10 15
 Gly Asp Leu Glu Lys Ile Glu Ile Ser Gln Asn Val Glu Val Glu Ala
 20 25 30
 Asp Val Ser Asn Pro Lys His Glu Ile Arg Ile Glu Lys Ala Asn Leu
 35 40 45
 Tyr Ile Asn Glu Phe Gln Asn Pro Asn Gln Tyr Leu Ile Ser Thr Gly
 50 55 60
 Lys His Leu Asp Val His Lys Ile His Ser Leu Gln Lys Val Leu Asp
 65 70 75 80

Ile Gln Ile Asn Ile His Glu Arg Asn Ser Val Gly Ser Phe Glu Ser
85 90 95
Val Ile Trp Asn Lys Gly Ile Gln Glu Ile His Asn Cys Gly Thr Gln
100 105 110
Asp Glu Asn Ser Asp Asn Asn Leu Glu Glu Leu Pro Asn Asp Val His
115 120 125
Ala Ser Gly Pro Val Ile Ile Ser Arg Thr Arg Ile His Ser Leu Ser
130 135 140
Tyr Gly Leu Glu Asn Lys Lys Arg Ala Arg Ser Thr Tyr Asn Leu Lys
145 150 155 160
Lys Leu Thr Leu Glu Lys Leu Val Ala Met Glu Ala Ser Thr
165 170

<210> 24
<211> 177
<212> PRT
<213> Artificial Sequence

<220>
<223> Leucine-rich repeats

<400> 24
Lys Leu Ile Glu Thr His Leu Arg Thr Ile Pro Ser His Ser Asn Leu
1 5 10 15
Pro Asn Ile Ser Arg Ile Tyr Val Ser Ile Val Thr Gln Gln Leu Glu
20 25 30
Ser His Ser Tyr Asn Ser Lys Val Thr His Ile Glu Ile Arg Thr Arg
35 40 45
Thr Tyr Ile Asp Asp Leu Lys Glu Pro Leu Lys Phe Gly Ile Phe Thr
50 55 60
Gly Leu Lys Met Phe Asp Leu Thr Lys Val Tyr Ser Thr Asp Ile Phe
65 70 75 80
Phe Ile Glu Ile Thr Pro Tyr Met Ser Val Asn Ala Gln Gly Cys Asn
85 90 95
Glu Thr Leu Thr Lys Tyr Asn Gly Phe Thr Ser Val Gln Gly Tyr Gly
100 105 110
Thr Lys Asp Ala Val Tyr Asn Lys Lys Tyr Leu Thr Val Ile Asp Lys
115 120 125
Asp Ala Gly Val Tyr Ser Gly Pro Ser Leu Val Ser Gln Thr Ser Val
130 135 140
Thr Ala Leu Ser Lys Gly Leu Glu His Lys Glu Ile Ala Arg Asn Thr
145 150 155 160
Trp Thr Leu Lys Lys Leu Leu Ser Leu Ser Leu His Thr Arg Ala Asp
165 170 175
Ser

<210> 25
<211> 89
<212> PRT
<213> Artificial Sequence

<220>

<223> C-flank cysteine-rich sequence

<400> 25

Leu Val Gly Asn Phe Lys Leu Lys Asp Ala Leu Ala Ala Arg Asp Phe
1 5 10 15
Ala Asn Leu Arg Ser Leu Ser Val Tyr Ala Tyr Gln Trp Gly Cys Asp
20 25 30
Ser Leu Cys Lys Leu Asn Thr Glu Asp Asn Ser Pro Gln Glu His Ser
35 40 45
Val Thr Lys Glu Lys Gly Ala Thr Asp Ala Ala Asn Val Thr Ser Thr
50 55 60
Ala Glu Asn Glu His Ser Gln Ile Ile Ile His Thr Ser Thr Gly Ala
65 70 75 80
Lys Tyr Leu Leu Gly Ser Trp Met Ile
85

<210> 26

<211> 99

<212> PRT

<213> Artificial Sequence

<220>

<223> C-flank cysteine-rich sequence

<400> 26

Leu Thr Gly Asn His Ala Leu Gln Ser Leu Ile Ser Ser Glu Asn Phe
1 5 10 15
Pro Glu Leu Lys Val Ile Glu Met Tyr Ala Tyr Gln Gly Val Cys Glu
20 25 30
Asn Ala Tyr Lys Ile Ser Asn Gln Trp Asn Lys Gly Asp Asn Ser Ser
35 40 45
Met Asp Asp Leu His Lys Lys Asp Ala Gly Met Phe Gln Ala Gln Asp
50 55 60
Glu Arg Asp Leu Asp Phe Leu Leu Asp Phe Glu Glu Asp Leu Lys Ala
65 70 75 80
Leu His Ser Val Gln Ser Ser Pro Gly Pro Lys His Leu Leu Asp Gly
85 90 95
Trp Leu Ile

<210> 27

<211> 75

<212> PRT

<213> Artificial Sequence

<220>

<223> C-flank cysteine-rich sequence

<400> 27

Ser His Arg Asn Leu Pro Thr Lys Glu Gln Asn Phe Ser His Ser Ile

1	5	10	15
Ser Glu Asn Phe Ser Lys Gln Cys Glu Ser Thr Val Arg Lys Val Ser			
20	25	30	
Asn Lys Thr Leu Tyr Ser Ser Met Leu Ala Ser Glu Leu Ser Gly Trp			
35	40	45	
Asp Tyr Glu Tyr Gly Phe Cys Leu Pro Lys Thr Pro Arg Ala Glu Pro			
50	55	60	
Asp Ala Asn Asp Ile Met Gly Tyr Asp Phe Leu			
65	70	75	

<210> 28
 <211> 82
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-flank cysteine-rich sequence

<400> 28

Ser His Ala Asn Trp Arg Arg Gln Ile Ser Glu Leu His Pro Ile Cys			
1	5	10	15
Asn Lys Ser Ile Leu Arg Gln Glu Val Asp Tyr Met Thr Gln Thr Arg			
20	25	30	
Gly Gln Arg Ser Ser Leu Ala Glu Asp Asn Ser Ser Tyr Ser Arg Gly			
35	40	45	
Phe Asp Met Thr Tyr Thr Glu Phe Asp Tyr Asp Leu Cys Asn Glu Val			
50	55	60	
Val Asp Val Thr Ser Lys Pro Asp Ala Asn Asp Ile Met Gly Tyr Asn			
65	70	75	80
Ile Leu			

<210> 29
 <211> 126
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-flank cysteine-rich sequence

<400> 29

Ser His Lys Asn Gln Lys Lys Ile Arg Gly Ile Leu Glu Ser Leu Met			
1	5	10	15
Cys Asn Glu Ser Ser Met Gln Ser Leu Arg Gln Arg Lys Ser Val Asn			
20	25	30	
Ala Leu Asn Ser Pro Leu His Gln Glu Tyr Glu Asn Leu Gly Asp Ser			
35	40	45	
Ile Val Gly Tyr Lys Glu Lys Ser Lys Phe Gln Asp Thr His Asn Asn			
50	55	60	
Ala His Tyr Tyr Val Phe Phe Glu Glu Gln Glu Asp Glu Ile Ile Gly			
65	70	75	80

Phe Gly Gln Glu Leu Lys Asn Pro Gln Glu Glu Thr Leu Gln Ala Phe
 85 90 95
 Asp Ser His Tyr Asp Tyr Thr Ile Cys Gly Asp Ser Glu Asp Met Val
 100 105 110
 Thr Lys Ser Asp Glu Asn Asp Ile Met Gly Tyr Lys Phe Leu
 115 120 125

<210> 30
 <211> 204
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Transmembrane

<400> 30
 Leu Thr Val Phe Phe Leu Val Leu Leu Phe Leu Leu Ile Leu Thr Val
 1 5 10 15
 Phe Ala Cys Ser Ser Pro Ala Ser Lys Leu Phe Ile Gly Leu Ile Ser
 20 25 30
 Val Ser Asn Leu Leu Met Ile Tyr Thr Gly Ile Leu Thr Phe Leu Ala
 35 40 45
 Val Ser Trp Gly Arg Phe Ala Glu Phe Gly Trp Glu Ser Lys Val Ser
 50 55 60
 Leu Ala Ser Ser Ala Phe Leu Leu Ala Ala Val Ser Val Phe Ala Lys
 65 70 75 80
 Asp Leu Met Lys His Gly Lys Ser Ser His Gln Phe Gln Val Ala Ala
 85 90 95
 Leu Leu Ala Leu Leu Gly Ala Ala Val Ala Gly Cys Phe Phe His Gly
 100 105 110
 Gly Gln Ser Ala Ser Pro Leu Phe Pro Thr Gly Glu Thr Pro Ser Leu
 115 120 125
 Gly Phe Thr Val Thr Leu Val Leu Ser Leu Leu Leu Met Ala Ile Ile
 130 135 140
 Thr Leu Cys Asn Leu Glu Lys Glu Asp Leu Ser Glu Asn Ser Gln Ser
 145 150 155 160
 Ser Val Ile His Val Trp Asn Cys Ile Phe Phe Cys Val Ala Phe Ser
 165 170 175
 Phe Ala Pro Leu Ile Thr Ala Ile Ser Ser Pro Glu Ile Met Ser Val
 180 185 190
 Thr Leu Ile Phe Leu Pro Ala Leu Val Val Phe Asn
 195 200

<210> 31
 <211> 197
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Transmembrane

<400> 31
 Ile Gly Val Thr Ala Val Leu Thr Cys Ala Leu Thr Ser Thr Val Phe
 1 5 10 15
 Arg Pro Leu Tyr Ile Ser Pro Ile Lys Leu Ile Gly Val Ile Ala Ala
 20 25 30
 Val Asn Met Leu Thr Val Ser Ser Ala Val Leu Gly Ala Phe Phe Gly
 35 40 45
 Ser Phe Ala Arg His Gly Ala Trp Glu Asn Val His Val Ile Leu Ser
 50 55 60
 Ile Ser Phe Leu Leu Ala Ala Gly Phe Ser Val Lys Tyr Ser Ala Lys
 65 70 75 80
 Phe Glu Thr Ala Pro Phe Ser Ser Leu Lys Val Ile Ile Leu Leu Cys
 85 90 95
 Ala Leu Leu Ala Leu Thr Met Ala Val Leu Gly Lys Gly Ala Ser Pro
 100 105 110
 Leu Leu Pro Phe Gly Glu Pro Ser Thr Met Gly Met Val Ala Leu Ile
 115 120 125
 Leu Ser Leu Cys Leu Met Met Thr Ile Ala Thr Leu Cys Asn Leu Asp
 130 135 140
 Lys Gly Asp Leu Glu Asn Ile Trp Cys Ser Met Val His Ile Leu Leu
 145 150 155 160
 Asn Cys Ile Leu Asn Cys Val Ala Leu Ser Phe Ser Leu Ile Asn Leu
 165 170 175
 Thr Phe Ser Pro Glu Val Ile Phe Ile Leu Val Val Val Leu Pro Ala
 180 185 190
 Leu Leu Ile Leu Asn
 195

<210> 32
 <211> 189
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Transmembrane

<400> 32
 Val Leu Ile Leu Asn Ile Ile Met Gly Met Thr Leu Phe Val Leu Leu
 1 5 10 15
 Thr Arg Tyr Lys Thr Val Pro Arg Phe Met Cys Asn Leu Ser Phe Ala
 20 25 30
 Asp Phe Cys Met Leu Tyr Leu Leu Leu Ile Ser Ser Gln Lys Gly Gln
 35 40 45
 Tyr Tyr Asn His Ala Asp Gln Ser Ser Thr Phe Thr Leu Tyr Thr Val
 50 55 60
 Ile Thr Trp His Thr Ile Thr Tyr Ala Ile His Leu Asp Gln Leu Arg
 65 70 75 80
 His Ala Ile Leu Ile Met Leu Gly Gly Trp Leu Phe Ser Ser Leu Ile
 85 90 95
 Met Leu Val Val Asn Met Lys Val Ser Ile Phe Met Asp Val Glu Thr
 100 105 110

Thr Leu Ser Gln Val Ile Leu Thr Ile Leu Ile Val Val Phe Ile Ile
 115 120 125
 Cys Ala Cys Ile Ile Phe Ala Val Arg Asn Pro Glu Leu Met Ala Thr
 130 135 140
 Asn Lys Thr Lys Ile Ala Lys Met Ile Asp Phe Thr Cys Met Ala Ile
 145 150 155 160
 Ser Phe Ala Ile Ala Ala Phe Lys Val Pro Leu Thr Val Thr Asn Ser
 165 170 175
 Val Leu Val Leu Tyr Ile Asn Ser Ala Phe Ala Ile Thr
 180 185

<210> 33
 <211> 190
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Transmembrane

<400> 33
 Val Leu Ile Phe Ser Ile Ile Thr Gly Ile Ile Leu Val Ile Leu Thr
 1 5 10 15
 Thr Gln Tyr Lys Thr Val Pro Arg Phe Met Cys Asn Leu Ala Phe Ala
 20 25 30
 Asp Leu Cys Ile Ile Tyr Leu Leu Leu Ile Ser Ile His Lys Ser Gln
 35 40 45
 Tyr His Asn Tyr Ala Asp Gln Ala Asp Ala Phe Thr Leu Tyr Thr Ala
 50 55 60
 Ile Thr Trp His Thr Ile Thr His Ala Met Gln Leu Asp Cys Val Gln
 65 70 75 80
 His Ala Ala Ser Val Met Val Met Gly Trp Ile Phe Ala Phe Ala Ala
 85 90 95
 Leu Phe Ile Phe Ile Ser Met Lys Val Ser Ile Met Asp Ile Asp Ser
 100 105 110
 Pro Leu Ser Gln Leu Val Met Ser Leu Leu Val Val Leu Val Val Ile
 115 120 125
 Cys Gly Cys Ile His Ile Leu Thr Val Arg Asn Pro Asn Ile Val Ser
 130 135 140
 Ser Ser Ser Thr Arg Ile Ala Arg Met Met Asp Phe Leu Cys Met Ala
 145 150 155 160
 Ile Ser Phe Ala Ile Ala Ser Leu Lys Val Pro Leu Thr Val Ser Lys
 165 170 175
 Ala Ile Leu Val Leu His Ile Asn Ser Ala Phe Ala Ile Thr
 180 185 190

<210> 34
 <211> 190
 <212> PRT
 <213> Artificial Sequence

<220>

<223> Transmembrane

<400> 34

Ile Val Val Phe Val Ser Leu Leu Leu Gly Val Phe Leu Leu Ile Leu
1 5 10 15
Leu Thr His Tyr Lys Asn Val Pro Arg Phe Met Cys Asn Leu Ala Phe
20 25 30
Ala Asp Phe Cys Met Met Tyr Leu Leu Leu Ile Ser Leu Tyr His Ser
35 40 45
Glu Tyr Tyr Asn His Ala Asp Gln Pro Asn Thr Phe Thr Leu Tyr Thr
50 55 60
Val Ile Thr Trp Tyr Ala Ile Thr Phe Ala Met Arg Leu Asp Arg Ile
65 70 75 80
Arg His Ala Cys Ala Ile Met Val Gly Gly Trp Val Cys Cys Phe Leu
85 90 95
Leu Leu Leu Val Ile Ser Ala Lys Val Ser Ile Met Asp Thr Glu Thr
100 105 110
Pro Leu Ala Leu Ala Ile Val Phe Val Leu Thr Ile Val Val Ile Val
115 120 125
Cys Cys Cys His Val Ile Ile Thr Val Arg Asn Pro Gln Tyr Asn Pro
130 135 140
Gly Asp Lys Thr Lys Ile Ala Arg Met Val Asp Phe Ile Cys Met Ala
145 150 155 160
Ile Ser Tyr Ala Leu Ala Ile Leu Asn Lys Pro Leu Thr Val Ser Asn
165 170 175
Ser Ile Leu Val Leu Tyr Leu Asn Ser Ala Phe Ala Ile Thr
180 185 190

<210> 35

<211> 143

<212> PRT

<213> Artificial Sequence

<220>

<223> C-terminal tail

<400> 35

Pro Lys Lys Glu Trp Lys Leu Lys Arg Arg Val Thr Arg Lys His Gly
1 5 10 15
Ser Val Ser Val Ser Ile Ser Ser Gln Gly Gly Cys Gly Glu Gln Asp
20 25 30
Phe Tyr Tyr Asp Cys Gly Met Tyr Ser His Leu Gln Gly Asn Leu Thr
35 40 45
Val Cys Asp Cys Cys Glu Ser Phe Leu Leu Thr Lys Pro Val Ser Cys
50 55 60
Lys His Leu Ile Lys Ser His Ser Cys Pro Val Leu Thr Ala Ala Ser
65 70 75 80
Cys Gln Arg Pro Glu Ala Tyr Trp Ser Asp Cys Gly Thr Gln Ser Ala
85 90 95
His Ser Asp Tyr Ala Asp Glu Glu Asp Ser Phe Val Ser Asp Ser Ser
100 105 110

Asp Gln Val Gln Ala Cys Gly Arg Ala Cys Phe Tyr Gln Ser Arg Gly
 115 120 125
 Phe Pro Leu Val Arg Tyr Ala Tyr Asn Leu Gln Arg Val Arg Asp
 130 135 140

<210> 36
 <211> 80
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-terminal tail

<400> 36
 Pro His Lys Glu Leu Val Ser Arg Lys Gln Thr Tyr Val Trp Thr Arg
 1 5 10 15
 Ser Lys His Pro Ser Leu Met Ser Ile Asn Ser Asp Asp Val Glu Lys
 20 25 30
 Gln Ser Cys Asp Ser Thr Gln Ala Leu Val Thr Phe Thr Ser Ser Ser
 35 40 45
 Ile Thr Tyr Asp Leu Pro Pro Ser Ser Val Pro Ser Pro Ala Tyr Pro
 50 55 60
 Val Thr Glu Ser Cys His Leu Ser Ser Val Ala Phe Val Pro Cys Leu
 65 70 75 80

<210> 37
 <211> 69
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-terminal tail

<400> 37
 Lys Thr Gln Arg Phe Phe Leu Leu Ser Lys Phe Gly Cys Cys Lys Arg
 1 5 10 15
 Arg Ala Glu Leu Tyr Arg Arg Lys Asp Phe Ser Ala Tyr Thr Ser Asn
 20 25 30
 Cys Lys Asn Gly Phe Thr Gly Ser Asn Lys Pro Ser Gln Ser Thr Leu
 35 40 45
 Lys Leu Ser Thr Leu His Cys Gln Gly Thr Ala Leu Leu Asp Lys Thr
 50 55 60
 Arg Tyr Thr Glu Cys
 65

<210> 38
 <211> 62
 <212> PRT
 <213> Artificial Sequence

<220>

<223> C-terminal tail

<400> 38

Lys Asn Arg Arg Phe Phe Ile Leu Ser Lys Cys Gly Cys Tyr Glu Met
1 5 10 15
Gln Ala Gln Ile Tyr Arg Thr Glu Thr Ser Ser Thr Val His Asn Thr
20 25 30
His Pro Arg Asn Gly His Cys Ser Ser Ala Pro Arg Val Thr Asn Gly
35 40 45
Ser Thr Tyr Ile Leu Val Pro Leu Ser His Leu Ala Gln Asn
50 55 60

<210> 39

<211> 79

<212> PRT

<213> Artificial Sequence

Q8
<220>

<223> C-terminal tail

<400> 39

Lys Ala Gln Arg Val Phe Ile Leu Ser Lys Phe Gly Ile Cys Lys Arg
1 5 10 15
Gln Ala Gln Ala Tyr Arg Gly Gln Arg Val Pro Pro Lys Asn Ser Thr
20 25 30
Asp Ile Gln Val Gln Lys Val Thr His Asp Met Arg Gln Gly Leu His
35 40 45
Asn Met Glu Asp Val Tyr Glu Leu Ile Glu Asn Ser His Leu Thr Pro
50 55 60
Lys Lys Gln Gly Gln Ile Ser Glu Glu Tyr Met Gln Thr Val Leu
65 70 75
